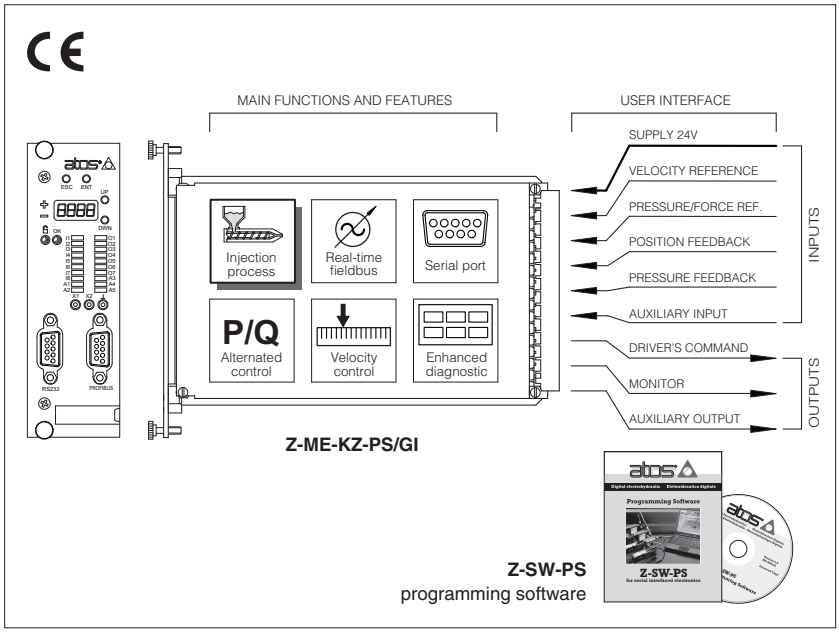
Plastic injection Z-ME-KZ-PS/GI controllers

Eurocard format, for electrohydraulic closed loop controls of injection in plastic presses



Z-ME-KZ-PS/GI

Plastic injection controllers perform velocity and force closed loop controls, according to real time commands (analog or fieldbus) generated by machine control unit (e.g. PLC).

The controller receives position / pressure feedbacks and generates reference signal to the proportional valve which regulates the hydraulic flow to the injection actuator.

The position feedback signal is software selectable: SSI, incremental encoder, potentiometer or analog (voltage or current).

Remote pressure transducers have to be remotely installed close to the injection actuator and connected to the controller (see section 5).

The machine electronic control unit manages the injection process through dedicated digital commands or fieldbus communication.

Serial and Profibus (only for BP option) ports are available on the front panel for controller configuration and diagnostics.

Electrical Features:

- 4 digits front panel display to check and change parameters as well as for diagnostics
- Front panel DB9 connector for serial programming interface
- Front panel test points for debug and maintenance
- Eurocard format (DIN 41494 - Plug-in-units)
- CE mark according to EMC directive

Software Features:

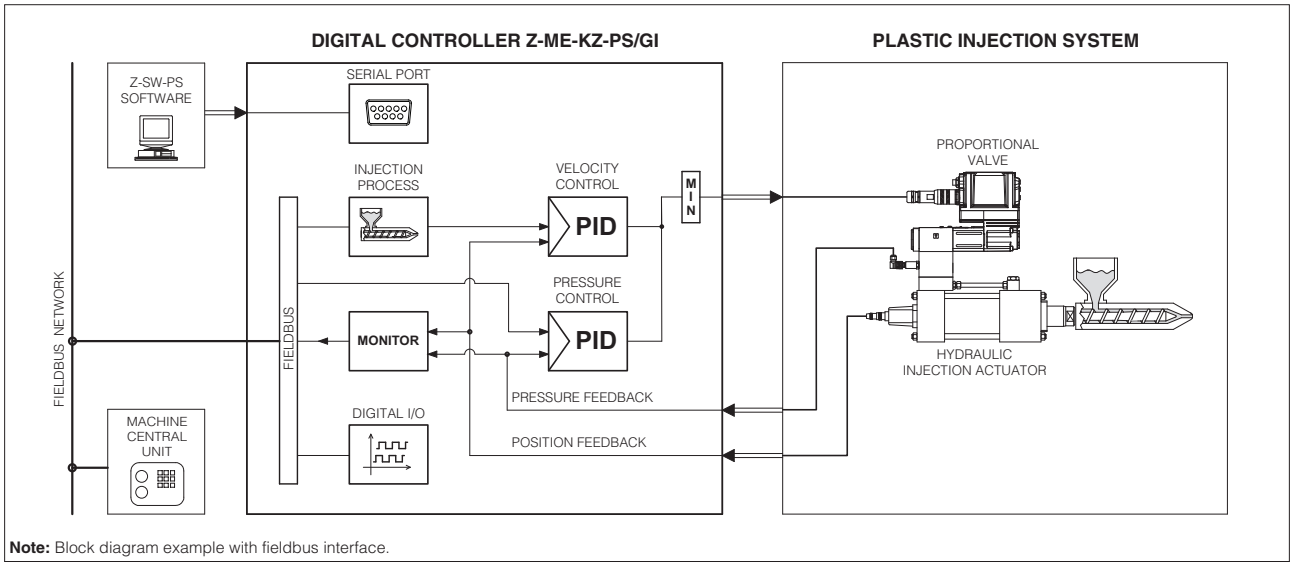
- Internal generation of injection cycle
- Setting of axis's dynamic response (PID) to optimize the injection performances
- Monitoring of injection process
- Software selectable range of electronic reference analog inputs: voltage or current
- Diagnostics of the injection status
- Intuitive graphic interface
- In field firmware update through standard serial communication port
- Internal oscilloscope function

1 MODEL CODE

Z-ME	-	KZ	-	PS	/	*	GI	/	*	/	*

- **Z-ME**: Electronic axis controller in Eurocard format
- **KZ**: Alternated position / velocity / force control module
- **PS**: Serial communication interface for configuration and monitoring function
- *****: **Optional fieldbus interfaces:**
  - = standard without fieldbus interface
  BC = CANopen communication interface
  BP = PROFIBUS DP communication interface
- **GI**: Injection process control
- *****: Series number
- *****: Set code

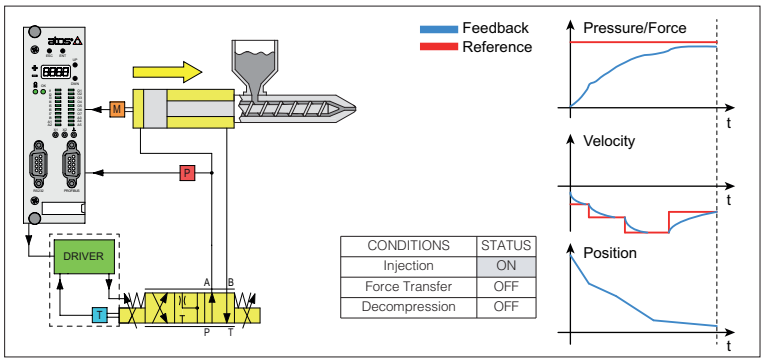
2 BLOCK DIAGRAM



Note: Block diagram example with fieldbus interface.

3 INJECTION PHASES

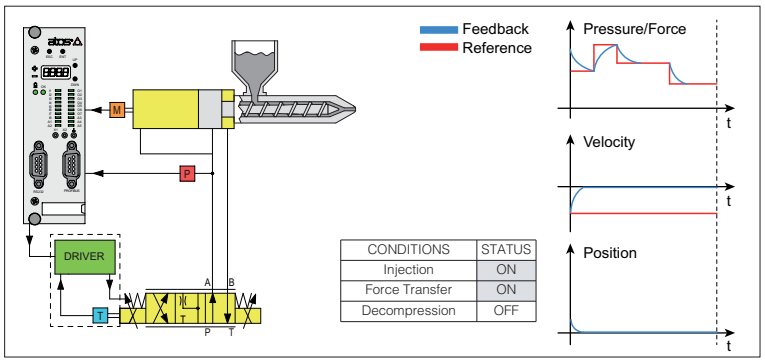
3.1 Injection - Velocity closed loop control with max pressure limitation



3.1 Injection

Injection phase starts when the machine control unit (e.g. PLC) enables the command “Injection”. The controller performs velocity closed loop profile according to the external velocity reference, with a maximum force limitation during traversing. Machine control unit provides velocity step reference to the controller, which internally limits acceleration and deceleration in order to avoid mechanicals stress during velocity variations

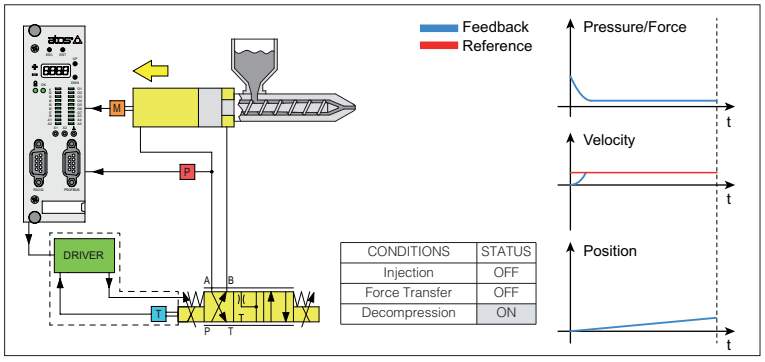
3.2 Pack and Hold - Pressure closed loop control with max velocity limitation



3.2 Pack and Hold

Pack and Hold phase starts when the machine control unit enables the command “Force Transfer” with “Injection” condition active. The controller performs pressure/force closed loop control with max velocity limitation to prevent sudden forward actuator movements in the transition from Injection to Pack and Hold phase

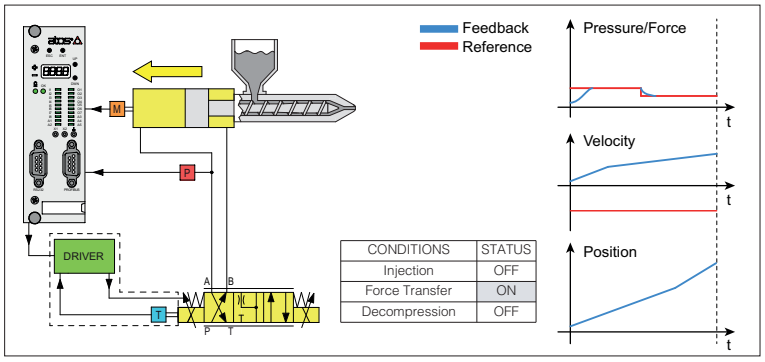
3.3 Pre-Decompression - Velocity open loop control



3.3 Pre-Decompression - optional phase

Pre-Decompression phase starts when the machine control unit enables the “Decompression” condition. The controller regulates in open loop the backward velocity of the injection actuator according to the external command signal (velocity reference)

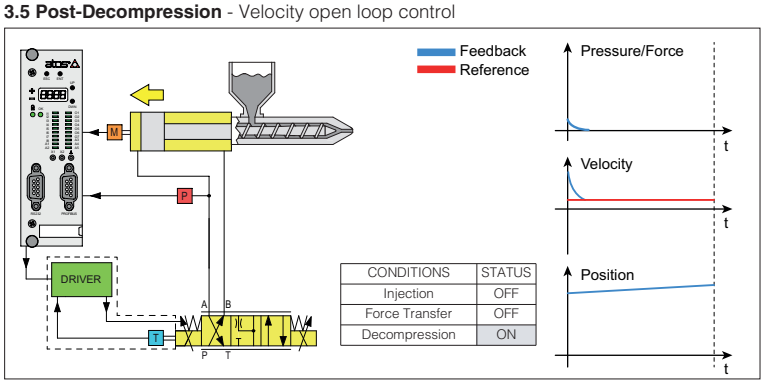
3.4 Back Pressure - Pressure closed loop control with max velocity limitation



3.4 Back Pressure

Back Pressure phase starts when the machine control unit enables the command “Force Transfer” with “Injection” condition not active. The controller performs force closed loop control with max velocity limitation to prevent sudden backward actuator movements in the transition from Pack and Hold or Pre-Decompression phase to Back Pressure ones

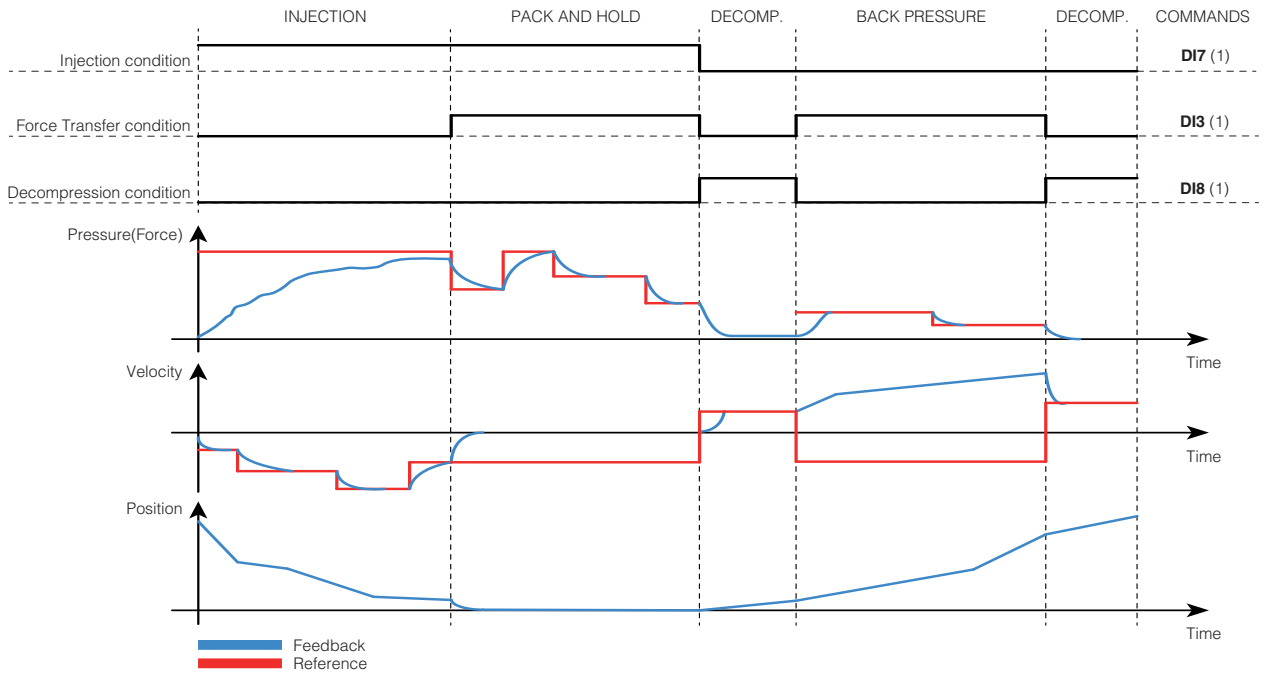
3.5 Post-Decompression - Velocity open loop control



3.5 Post-Decompression - optional phase

Post-Decompression phase starts when the machine control unit enables the “Decompression” condition. The controller regulates in open loop the backward velocity of the injection actuator according to the external command signal (velocity reference)

4 EXAMPLE OF INJECTION CYCLE WITH DIGITAL COMMANDS FROM MACHINE CENTRAL UNIT

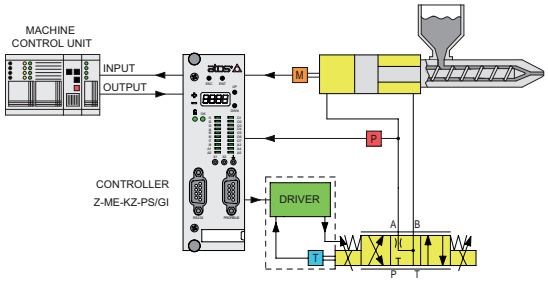
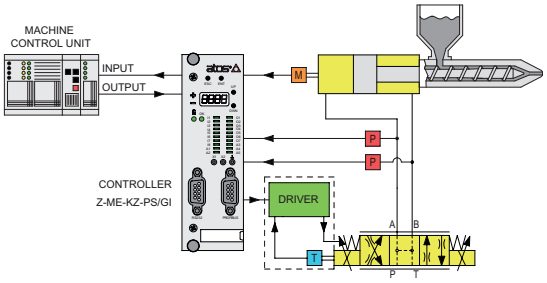


Note: (1) see section 11 for digital inputs commands connection

Note: for controllers with BP or BC option the injection cycle is managed by fieldbus commands

5 PRESSURE / FORCE CONFIGURATION

For technical support about proportional valve selection and control electronic configuration, please contact Atos tech assistance at ele-support@atos.com

Alternated Velocity/Pressure Control - One pressure transducer	Alternated Velocity/Force Control - Two pressure transducers
	
Typical schemes used in injection molding machines designed for **high/medium density materials**. Proportional valves with V9 spool type (see section 6) should be used. A remote pressure transducer has to be installed on the injection line of the actuator.	Typical schemes used in injection molding machines designed for **low density materials**. Proportional valves with linear spool type with zero overlap characteristics is strictly recommended to obtain improved force control. Two remote pressure transducers have to be installed on the actuator's ports; the actuator force is calculated by the pressure feedbacks (Pa - Pb).

T valve's spool transducer

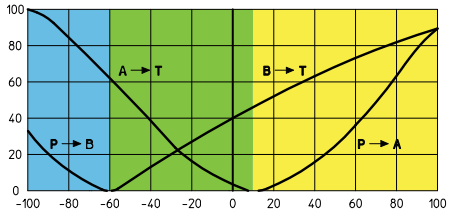
M actuator's position transducer

P pressure transducer

6 SPECIAL SPOOL FOR INJECTION PROCESS

V9 main features:

- strong meter-in characteristic allows the pressure control during the holding pressure and the plasticizing phases
- safety central position depressurizes the actuator chambers
- large flow capability, required during the plasticizing phase, discharges big oil volumes from injection actuators with low pressure drops and also permits the contemporary oil suction from tank



backward movements (flow active)

depressuring (pressure active)

forward movements (flow or pressure active)

7 CONTROLLER CHARACTERISTICS

Power supply (see 12.1)	Nominal: +24 VDC Rectified and filtered: VRMS = 20 ÷ 32 VMAX (ripple max 10 % VPP)		
Max power consumption	10 W		
Position transducer	SSI, incremental encoder, potentiometer, analog		
Analog Inputs	Input range : voltage ±10 VDC - input impedance: Ri > 100 kΩ current 0 ÷ 20 mA - input impedance: Ri < 500 Ω		
Analog Outputs	Output range : voltage ±10 VDC @ max 10 mA current 0 ÷ 20 mA @ max 500 Ω load resistance		
Digital Inputs	Input range : 0 ÷ 5 VDC (OFF state), 16 ÷ 24 VDC (ON state), 5 ÷ 16 VDC (not accepted); Input impedance: Ri > 10 kΩ		
Digital Outputs **(1)**	Output range : 0 ÷ 24 VDC (ON state > [power supply - 2 V] ; OFF state < 1 V) @ max 30 mA		
Enable input	Range : 0 ÷ 5 VDC (OFF state), 16 ÷ 24 VDC (ON state), 5 ÷ 16 VDC (not accepted); Input impedance: Ri > 10 kΩ		
Fault output **(1)**	Output range : 0 ÷ 24 VDC (no fault state > [power supply - 2 V] ; fault state < 1 V) @ max 50 mA		
Analog reference outputs	±10 VDC @ max 30 mA		
Inceremental encoder power supply	+5 VDC @ max 100 mA		
Alarms	Position transducer out of range, analog input out of range		
Card format	Eurocard 100x160 mm (Plug-in unit DIN 41494)		
Card rear connector	Male DIN EN 60603/G. Available frame snap connector type E-K-64M (see tech table G800) **To be ordered separately**		
Operating temperature	0 ÷ +50 °C (storage -20 ÷ +70 °C)		
Front panel dimensions	128,4 x 40 mm		
Mass	Approx. 250 g		
Electromagnetic compatibility (EMC)	According to Directive 2004/108/CE (Immunity: EN 50082-2; Emission: EN 50081-2)		
Communication interface	Serial Atos ASCII coding	CANopen EN50325-4 + DS408	PROFIBUS EN50170-2/IEC61158
Communication physical layer	not insulated serial RS232	optical insulated CAN ISO11898	optical insulated RS485

Note: (1) external negative voltage not allowed (e.g. due to inductive loads)

8 TRANSDUCER CHARACTERISTICS

8.1 Position transducers

The accuracy of the velocity control is strongly dependent to the selected position transducer. Four different transducer interfaces are available on the controller, according to the system requirements: potentiometer, analog signal, SSI, and encoder, see 8.3.
Transducers with digital interface (SSI and encoder) allow the user to get high resolution and accurate measures. Transducers with analog interface (potentiometer and analog signal) grant simple and cost effective solutions.

8.2 Pressure transducers

The accuracy of the pressure/force controls is strongly dependent to the selected pressure transducers. Alternated pressure or force controls require to install pressure transducers to measure the actual pressure values.
Pressure transducers allow easy system integration and cost effective solution for both alternated position/pressure and position/force controls (see tech table **G465** for pressure transducers details).
The characteristics of the remote pressure transducers must be always selected to match the application requirements and to obtain the best performances: transducer nominal range should be at least 115%÷120% of the maximum regulated pressure/force.

8.3 Transducers characteristics & interfaces - following values are just for reference, for details please consult the transducer's datasheet

	Position				**Pressure/Force**
Input type	Potentiometer	Analog	SSI	Incremental Encoder	Analog
Power supply **(1)**	±10 VDC	+24 VDC	+5 VDC / +24 VDC	+5 VDC / +24 VDC	+24 VDC
Controller Interface	±10V	0 ÷ 10V 4 ÷ 20 mA	Serial SSI binary/gray	TTL 5Vpp - 150 KHz	±10 VDC 4 ÷ 20 mA
Max speed	0,5 m/s	1 m/s	2 m/s	2 m/s	-
Max Resolution	< 0.4 % FS	< 0.2 % FS	1 µm	1 µm (@ 0.15 m/s)	< 0.4 % FS
Linearity error **(2)**	± 0.1% FS	< ±0.03% FS	< ± 0.01 % FS	< ± 0.001 % FS	< ±0.25% FS
Repeatability **(2)**	± 0.05% FS	< ± 0.005% FS	< ± 0.001 % FS	< ± 0.001 % FS	< ±0.1% FS

Notes: **(1)** power supply provided by digital controller **(2)** percentage of total stroke

9 FRONT PANEL DESCRIPTION

9.1 Keyboard and display

On the Z-ME-KZ-PS/GI front panel are available 4 function keys (ESC, ENT, UP, DWN), and a numeric display (4 digits plus sign) to allow the user to view and change the controller's parameters as well as to display diagnostic messages.
The following parameters can be accessed (viewed or changed) via corresponding menu structure:
- command and actual values
- analog input / output values
- digital input / output status
- position sensor indication
- force / pressure sensor indication

Parameter's changes of the configuration, control gains, trigger conditions, internal cycle, fault monitoring are not allowed via front panel operations.

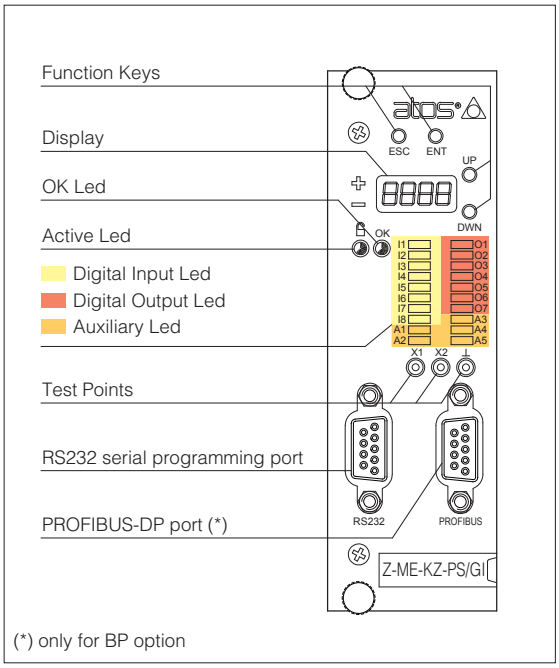
9.2 LED indication

The led indications are used to display the internal status (Active, OK) of the controller or the status of the digital IO of the Z-ME-KZ-PS/GI. There are 22 led divided in four different types:
- internal controller's status (Active - OK)
- digital input status (I1 ÷ I8)
- digital output status (O1 ÷ O7)
- software programmable led (A1 ÷ A5) for specific functions

9.3 Test points

The test points present on the controller front panel can be used to monitor the actual position (X1) and the force / pressure (X2) value measured by the relevant transducers. Both signals are referred to the analog ground (⊥) pin. The two signals are respectively connected to P_MONITOR+ (X1) and F_MONITOR+ (X2) analog output present on the rear connector of the controller card. These signals can be software set to show other signals available in the controller (see 12.7 and 12.8).

10 FRONT PANEL VIEW



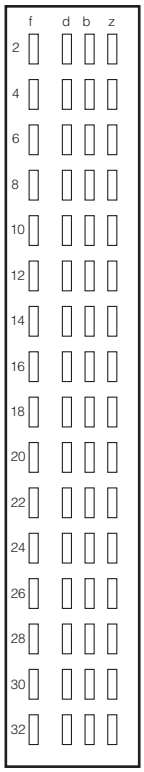
(*) only for BP option

9.4 Communication ports

On the front panel of the Z-ME-KZ-PS/GI is always present a serial RS232 port to program the controller by the Atos Z-SW software (see section 13). All the functional parameters of digital controller, like internal reference generation, controller dynamics, IO configurations, can be easily set and optimized by the user.
For BP or BC options, a second communication port dedicated to the selected fieldbus connection is present on the controller. For BP option the PROFIBUS-DP port is located on the front panel of the Z-ME-KZ-PS/GI controller. For BC option the CANopen connection is located on the rear connector of the Z-ME-KZ-PS/GI controller.
Through the fieldbus communication only the real-time parameters may be exchanged:
- position, velocity and force / pressure reference
- position, velocity and force / pressure feedback
- controller commands and status
- diagnostic / error messages

For more information about the front panel settings and fieldbus communication, please refer to the controller user manual.

11 ELECTRONIC CONNECTIONS - 64 PIN REAR CONNECTOR



rear view

pin	f		d		b		z	
2	DO 7	(O)	DI 1	(I)	nc	(I)	nc	
4	SSI clock +	(D)	DI 2 (*)	(I)	nc	(I)	nc	
6	SSI clock -	(D)	DI 3 Force Transfer	(I)	F_TR1 +	(I)	nc	
8	SSI data + / Inc Ua1	(D)	DI 4 Jog +	(I)	F_TR1 -	(I)	nc	
10	SSI data - / Inc /Ua1	(D)	DI 5	(I)	F_INPUT +	(I)	nc	
12	Inc Ua2	(D)	DI 6 Jog -	(I)	F_INPUT -	(I)	nc	
14	Inc /Ua2	(D)	DI 7 Injection	(I)	F_TR2 +	(I)	nc	
16	Inc Ua0	(D)	DI 8 Decompression	(I)	F_TR2 -	(I)	nc	
18	Inc /Ua0	(D)	ENABLE	(I)	P_TR +	(I)	nc	
20	Inc +5VDC	(O)	DO 1	(O)	P_TR -	(I)	GND	
22	nc		FAULT	(O)	V_INPUT +	(I)	DO 3	(O)
24	nc		nc		V_INPUT -	(I)	DO 4	(O)
26	nc		DO 2	(O)	P_MONITOR +	(O)	DO 5	(O)
28	CAN_GND	(F)	nc		AGND		DO 6	(O)
30	CAN_L	(F)	CONTROL_OUTPUT +	(O)	VREF -10VDC	(O)	V+	(PS)
32	CAN_H	(F)	F_MONITOR +	(O)	VREF +10VDC	(O)	V0	(PS)

(I) Input - **(O)** Output - **(D)** Digital transducers - **(PS)** Power supply - **(F)** Fieldbus interface, only for BC option
(*) Digital Input status must be always disabled (OFF) - Do Not Connect

12 SIGNAL SPECIFICATIONS

Atos digital controllers are CE marked according to the applicable directives (e.g. Immunity/Emission EMC Directive).
Installation, wirings and start-up procedures must be performed according to the prescriptions shown in table **F003** and in the user manuals included in the Z-SW programming software.
The electrical signals of the controller (e.g. monitor signals) must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards.

12.1 Power supply (V+ and V0)

The power supply must be appropriately stabilized or rectified and filtered: apply at least a 10000 μF/40 V capacitance to single phase rectifiers or a 4700 μF/40 V capacitance to three phase rectifiers.
The controller is protected against overloads by a internal safety fuse: 3,15 A Time-delay fuse.

12.2 Velocity reference input signal (V_INPUT+, V_INPUT-)

The controller allows to limit the axis velocity according to an external voltage or current reference input signal (V_INPUT+ and V_INPUT-). The analog input is a differential input type.
The input range and polarity are software selectable within the maximum range ±10 VDC for voltage or 0 ÷ 20 mA for current; default setting is 0 ÷ 10 VDC.
Controller with fieldbus interface (BC or BP) can be software set to receive reference value directly by the machine control unit (fieldbus master); in this case the analog reference input signal can be used for start-up and maintenance operations.

12.3 Pressure or force reference input signals (F_INPUT+,F_INPUT-)

For alternated position/force (or position/pressure) control the Z-ME-KZ-PS/GI receives a second analog voltage or current reference input signal (F_INPUT+,F_INPUT-) dedicated to the force (or pressure) closed loop control. The analog input is a differential input type.
The input range and polarity are software selectable within the maximum range ±10 VDC for voltage or 0 ÷ 20 mA for current; default setting is 0 ÷ 10 VDC.
Controller with fieldbus interface (BC or BP) can be software set to receive reference value directly by the machine electronic control unit (fieldbus master); in this case the analog reference input signals can be used for start-up and maintenance operations.

12.4 Position transducer input signal

A position transducer must be always directly connected to the controller: digital SSI (SSI clock+, SSI clock-, SSI data+, SSI data-), digital Encoder (Inc Ua1, Inc /Ua1, Inc Ua2, Inc /Ua2,Inc Ua0, Inc /Ua0), potentiometer or a generic transducer with analog interface (P_TR+, P_TR-) can be used.
For transducers with analog interface the input range and polarity are software selectable within the maximum range ±10 VDC for voltage or 0 ÷ 20 mA for current; default setting is 0 ÷ 10 VDC.
Refer to position transducer characteristics to select the transducer type that matches the specific application requirements (see 8.1).

12.5 Pressure transducer input signal (F_TR1+, F_TR1-, F_TR2+, F_TR2-)

Analog remote pressure transducers must be always directly connected to the controller.
One transducer must be connected in case of alternated position/pressure control; two transducers must be connected in case of alternated position/force control.
Refer to pressure transducer characteristics to select the transducer type that mach the specific application requirements (see 8.2).
The input range and polarity are software selectable within the maximum range ±10 VDC for voltage or 0 ÷ 20 mA for current; default setting is 0 ÷ 10 VDC.

12.6 Control output signal (CONTROL_OUTPUT+)

The error signal processed by the control algorithms generates the control output signal (CONTROL_OUTPUT+) for the external driver of the proportional valve which operates the hydraulic flow to the actuator.
The output range and polarity are software selectable within ±10 VDC (for voltage) or 0 ÷ 20 mA (for current) maximum range referred to the analog ground (AGND); default setting is ±10 VDC.

12.7 Position monitor output signal (P_MONITOR+)

The controller generates an analog voltage output signal proportional to the actual axis position; the monitor output signal can be software set to show other signals available in the controller (e.g. position analog reference, position fieldbus reference, position error).
The output polarity is software selectable within ±10 VDC maximum range referred to the analog ground (AGND); default setting is ±10 VDC.
The P_MONITOR+ signal is also present on the front panel at test point X1.

12.8 Pressure or force monitor output signal (F_MONITOR+)

The controller generates an analog voltage output signal proportional to the actual pressure or force applied to the actuator; the monitor output signals can be software set to show other signals available in the controller (e.g. pressure/force analog reference, pressure/force fieldbus reference, pressure/force error).
The output polarity is software selectable within ±10 VDC maximum range referred to the analog ground (AGND); default setting is ±10 VDC.
The F_MONITOR+ signal is also present on the front panel at test point X2.

12.9 Enable Input Signal (ENABLE)

To enable the controller, a 24VDC voltage has to be applied on pin d18 referred to pin b28.
When the Enable signal is set to zero the controller can be software set to perform one of the following actions:
- move forward or backward in open loop - default setting
- maintain in closed loop a predefined actuator's position (hold position)
- maintain the actuator actual position in close loop control
- disable the controller functioning (control output set to zero)

12.10 Fault output signal (FAULT)

Fault output signal indicates fault conditions of the controller (alarm active, reference or transducer signal cable broken, max error exceeded, etc.).
Fault presence corresponds to 0 VDC, normal working corresponds to 24 VDC (pin d22 referred to pin b28).

12.11 Power supply signal for potentiometer position transducer (VREF -10VDC, VREF +10VDC)

Power supply for potentiometer position transducer may be generated from the controller card using the VREF -10VDC and VREF +10VDC signal @ max 30 mA.

12.12 Power supply for incremental encoder position transducer (Inc +5VDC, GND)

Power supply for incremental encoder position transducer may be generated from the controller card using the +5VDC @ max 100 mA.

12.13 Digital input signals (DI1 - DI8)

Five pre-configured digital inputs (DI3, DI4, DI6, DI7, DI8) are dedicated to manage of the injection process, while two digital inputs (DI1, DI5) are used to trigger a command or to read a system state. For DI1 and DI5 input by the Z-SW software, it is possible to set the polarity and to match a proper condition within the following:
- start/stop/switch-over command in case of internal reference generation
- specific operative command for hydraulic axis mode (referencing mode, jog mode, automatic mode)
- jog command
- disable pressure / force alternated control

12.14 Digital output signals (DO1 - DO7)

Seven digital outputs can be used to generate digital signals useful to the system synchronization and for monitoring purpose. The digital outputs can be configured in polarity and all the channels can be independently programmed by the Z-SW software.
Typically the digital outputs are used to:
- set alarm condition related with the hydraulic axis working phase
- identify a particular working condition to synchronize other machine functionalities
- signal target position reached
- signal pressure / force control active
- signal tracking error

12.15 CANopen communication signals - only for **BC** option

For controllers with CANopen communication interface, the connections are located on the rear connector: pin f28 (CAN_GND), pin f30 (CAN_L) and pin f32 (CAN_H).

13 PROGRAMMING TOOLS - see tech table **GS500**

Valve's functional parameters and configurations, can be easily set and optimized using Atos Z-SW programming software connected via serial communication port to the digital controller. Z-SW software is available in different versions according to the controllers's communication interface: PS (Serial) Z-SW-PS, BC (CANopen) Z-SW-BC and BP (PROFIBUS DP) Z-SW-BP.
For fieldbus versions, Z-SW software permits valve's parameterization through serial communication port also if the controller is connected to the central machine unit via fieldbus.

Full programming software, to be ordered separately :

Z-SW-* DVD first supply = software has to be activated via web registration at www.download.atos.com ; 1 year service included
Upon web registration user receive via email the Activation Code (software license) and login data to access personal Atos Download Area.
The software remains active for 10 days from the installation date and then it stops until the user inputs the Activation Code.

Z-SW-*-N DVD next supplies = only for supplies after the first; service not included, web registration not allowed
Software has to be activated with Activation Code received upon first supply web registration

Atos Download Area: direct access to latest releases of Z-SW software, manuals, USB drivers and fieldbus configuration files at www.download.atos.com

USB Adapters, Cables and Terminators, can be ordered separately

14 MAIN SOFTWARE PARAMETER SETTINGS

For a detailed descriptions of the available settings, wirings and installation procedures, please refer to the user manuals included in the Z-SW-* DVD programming software:

Z-MAN-ME-KZ-GI - user manual for **Z-ME-KZ-PS/GI**

14.1 External reference and transducer parameters

Allow to configure the controller reference and transducer inputs, analog or digital, to match the specific application requirements:
- *Scaling parameters* define the correspondence of these signals with the specific actuator stroke or force to be controlled
- *Limit parameters* define maximum/minimum stroke and force to detect possible alarm conditions
- *Homing parameters* define the startup procedure to initialize incremental transducer (e.g. encoder)

14.2 Position PID control dynamics parameters

Allow to optimize and adapt the position controller closed loop to the wide range of hydraulic system characteristics:
- *PID (position)* each part of the position controller closed loop algorithm (proportional, fine positioning advanced integral, derivative, feed forward, etc.) can be modified in order to match the application requirements

14.3 Multiple pressure/force PID control dynamics parameters

Allow to customize and adapt the pressure/force controller closed loop to each injection cycle phase:
- *PID (pressure/force)* each part of the pressure/force controller closed loop algorithm (proportional, integral, derivative, feed forward, etc) can be modified in order to match the phases requirements

14.4 Control output signal parameters

Allow to configure the controller command for the proportional valve which regulates the hydraulic flow to the actuator:
- *Scaling parameters* define the correspondence of the command signal to the specific valve reference signal range
- *Limit parameters* define maximum/minimum range to detect possible alarm conditions

14.5 Monitoring parameters

Allow to configure the controller monitoring function of the positioning error (difference between actual reference and feedback) and detects anomalous conditions:
- *Monitoring parameters* maximum allowed errors can be set for both static and dynamic positioning phases, and dedicated waiting times can be set to delay the activation of the alarm condition and relevant reaction (see 14.6)

14.6 Fault parameters

Allow to configure how the controller detect and react to alarm conditions:
- *Diagnostics parameters* define different conditions, threshold and delay time to detect alarm conditions
- *Reaction parameters* define different actions to be performed in case of alarm presence (stop at actual or preprogrammed position, emergency forward/backward, controller disabling, etc.)

14.7 Digital IO configuration

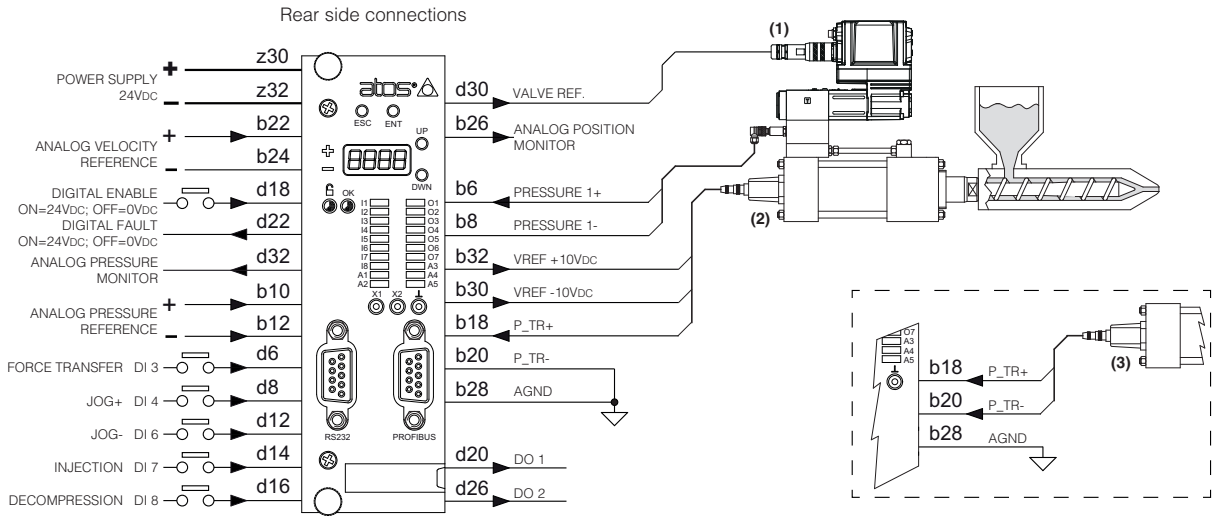
Allow to configure the controller's digital inputs/outputs to trigger/generate signals from /for the external machine central unit:
- *Polarity* define the signal active state
- *Trigger condition* define the input state to run a predefined internal command (see 12.13)
- *Output state* define the digital output based on the internal controller state (see 12.14)

14.8 Motion phases parameters

When the internal reference generation is active a pre-programmed cycle can be generated; start/stop/switch-over commands and reference generation types parameters can be set to design a customized sequence of motion phases adapted to the specific application requirements.

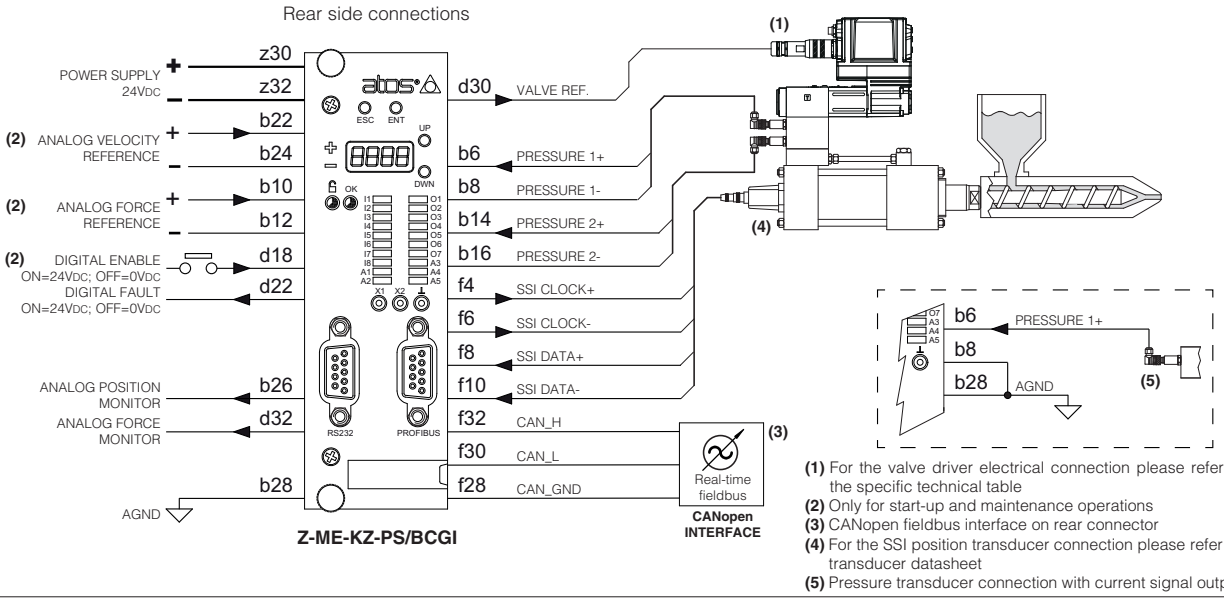
15 WIRING BLOCK EXAMPLES

15.1 External analog reference - potentiometer actuator transducer - 1 pressure transducer



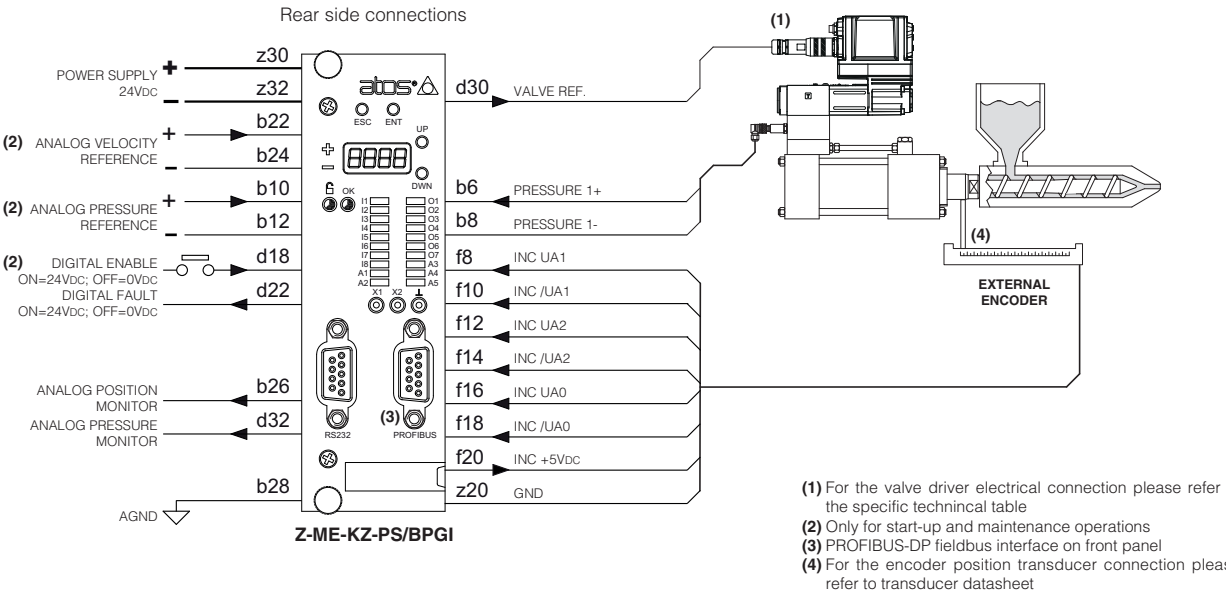
(1) For the valve driver electrical connection please refer to the specific technical table
(2) For the potentiometer position transducer connection please refer to transducer datasheet
(3) For the analog position transducer connection please refer to transducer datasheet

15.2 External reference - SSI actuator transducer - 2 pressure transducers - CANopen



(1) For the valve driver electrical connection please refer to the specific technical table
(2) Only for start-up and maintenance operations
(3) CANopen fieldbus interface on rear connector
(4) For the SSI position transducer connection please refer to transducer datasheet
(5) Pressure transducer connection with current signal output

15.3 internal reference generation - encoder actuator transducer - 1 pressure transducer - PROFIBUS-DP



(1) For the valve driver electrical connection please refer to the specific technincal table
(2) Only for start-up and maintenance operations
(3) PROFIBUS-DP fieldbus interface on front panel
(4) For the encoder position transducer connection please refer to transducer datasheet